OIPE IAP74
OCT 16 2006
PATENT & TRADEMARK OFFICE

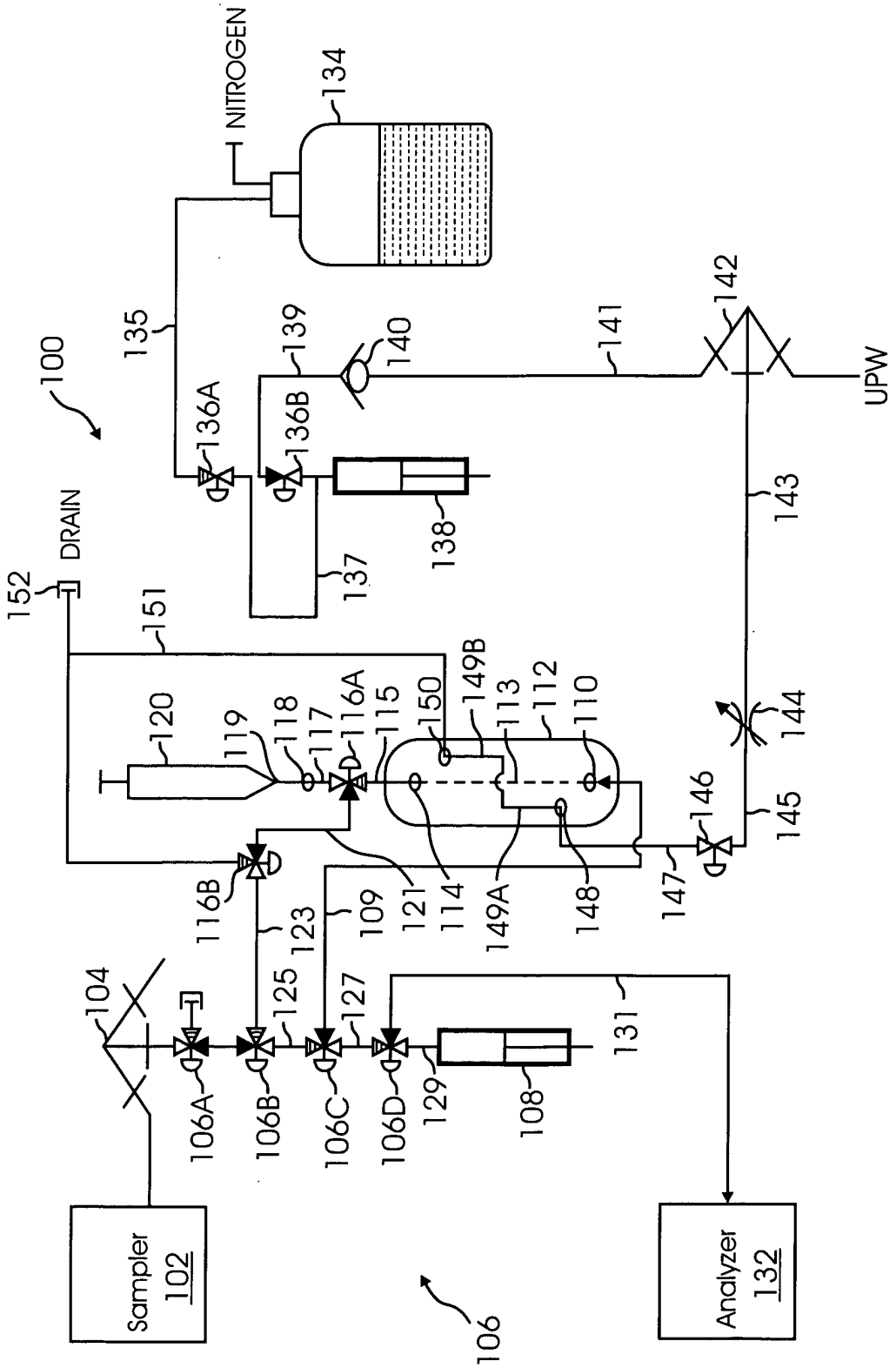

FIG. 1

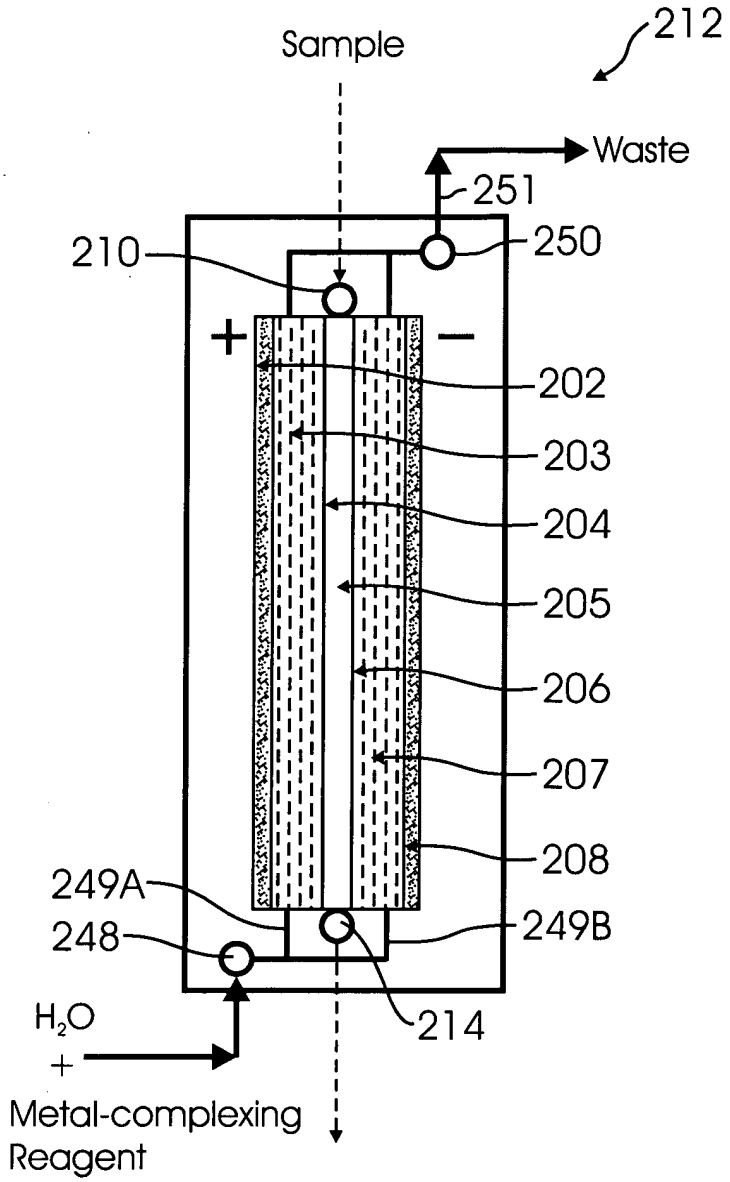
Sample
212
Waste
251
210
250
+
−
202
203
204
205
206
207
208
249A
248
249B
214
H_2O
+
Metal-complexing
Reagent

FIG. 2

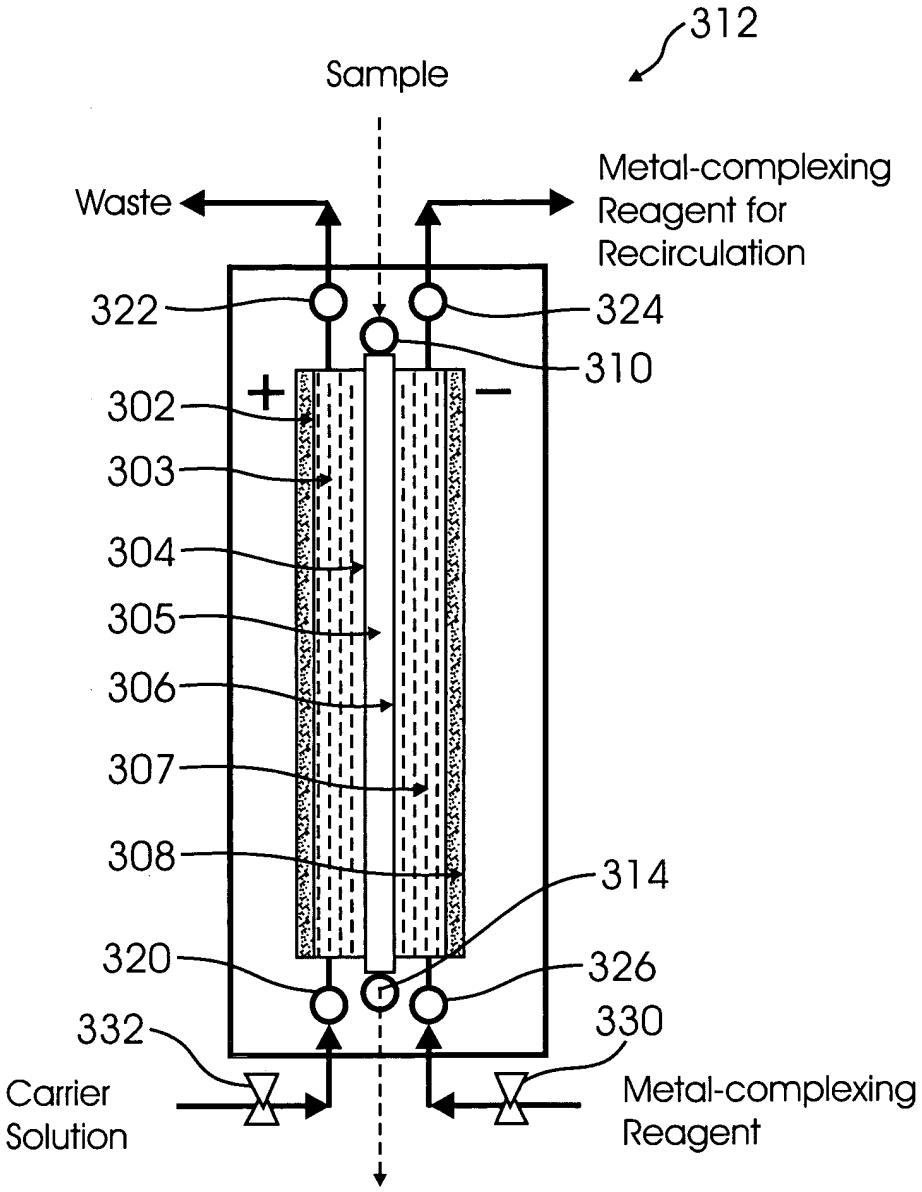
312
Sample
Waste
Metal-complexing
Reagent for
Recirculation
322
324
310
302
303
304
305
306
307
308
314
320
326
330
332
Carrier
Solution
Metal-complexing
Reagent

FIG. 3A

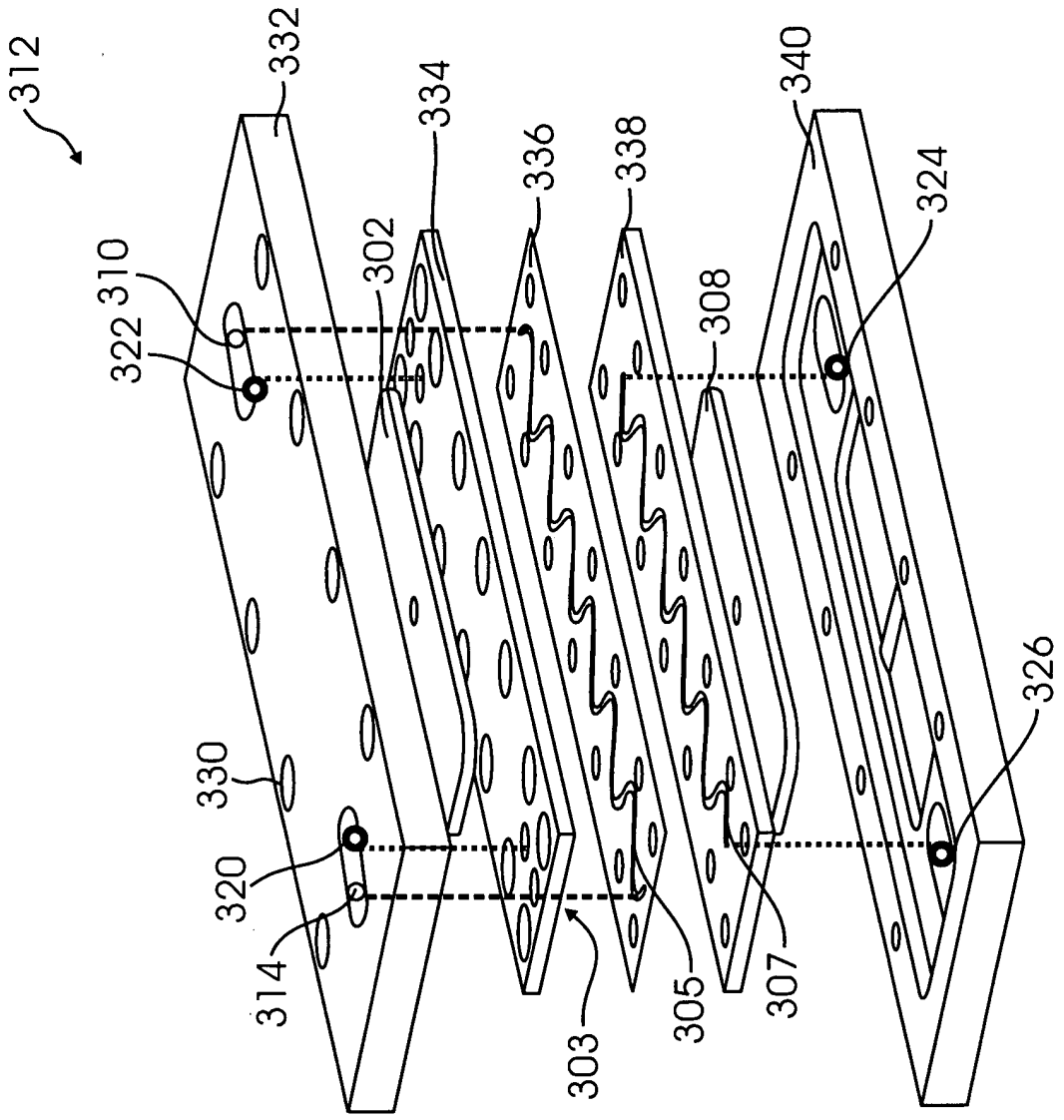
312
332
334
336
338
340
324
310
322
302
308
330
320
314
303
305
307
326

FIG. 3B

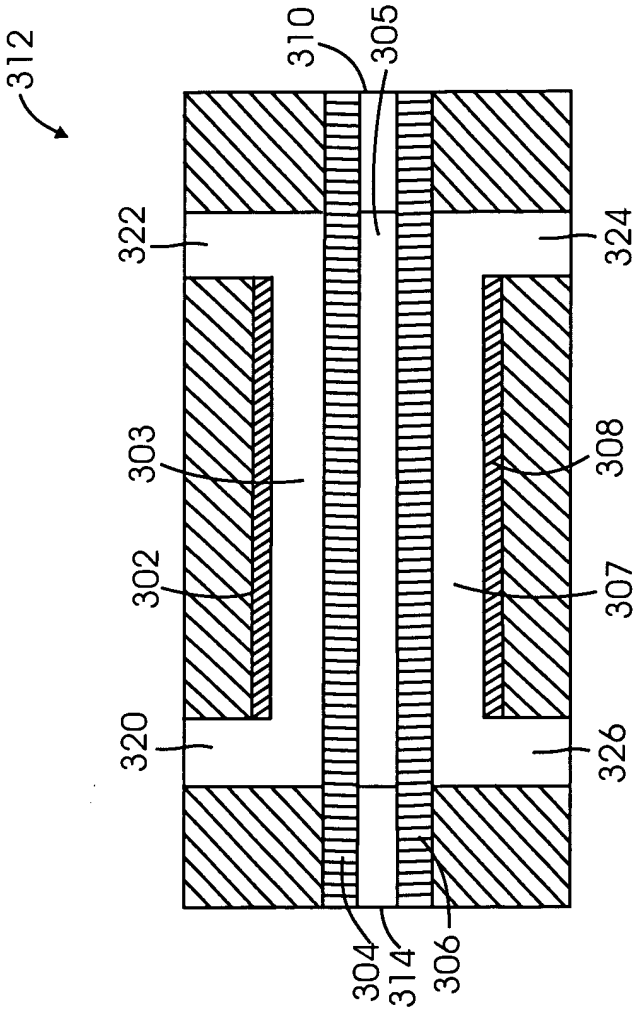

FIG. 3C

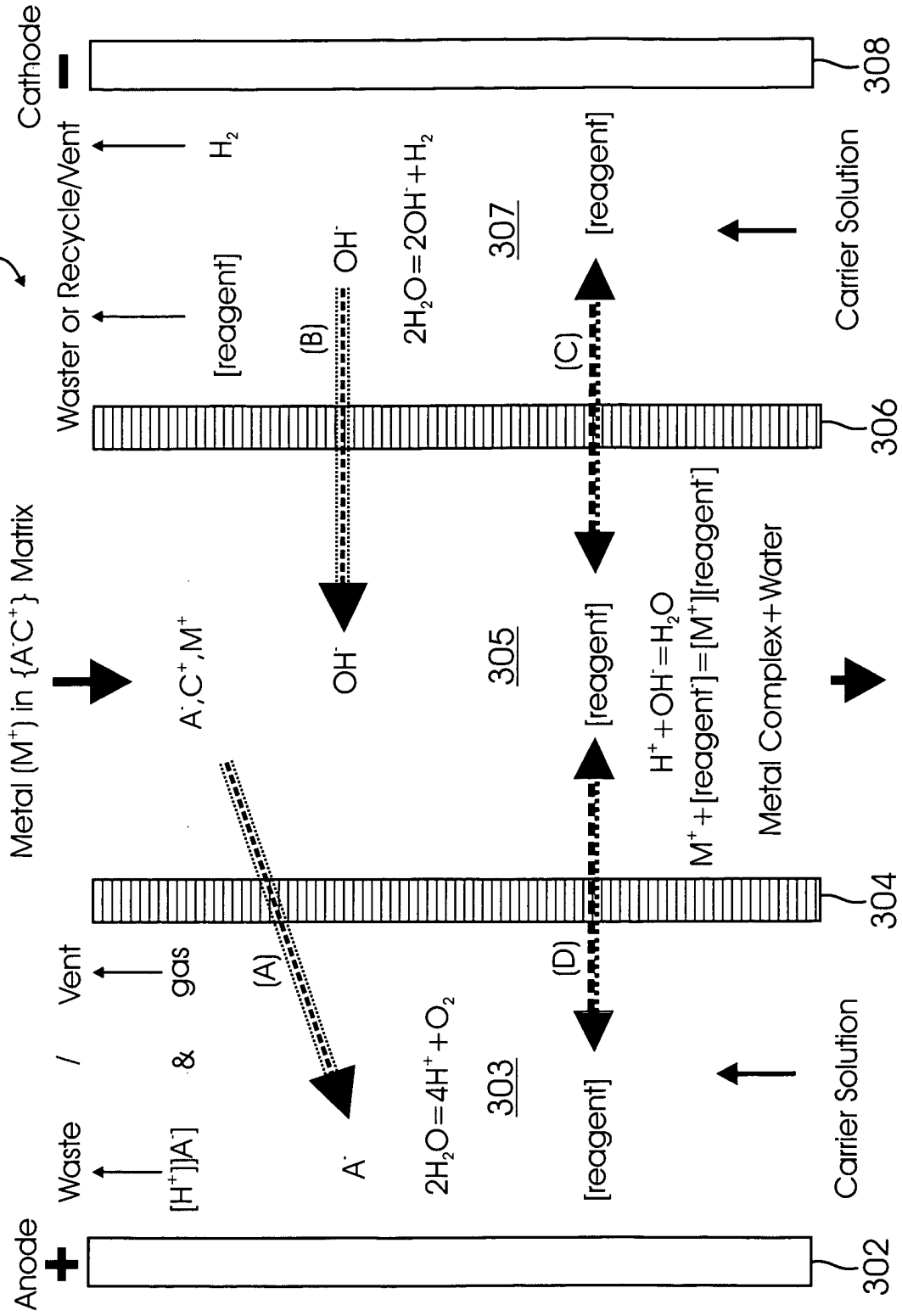
312
Cathode
308
Waster or Recycle/Vent
H_2
[reagent]
(B)
OH^-
$2H_2O=2OH^-+H_2$
307
(C)
[reagent]
Carrier Solution
306
Metal (M^+) in {A^-C^+} Matrix
A^-,C^+,M^+
OH^-
305
[reagent]
$H^+ + OH^- = H_2O$
$M^+ + [reagent^-] = [M^+][reagent^-]$
Metal Complex+Water
304
Waste / Vent
$[H^+]A^-$ & gas
(A)
A^-
$2H_2O=4H^+ + O_2$
303
(D)
[reagent]
Carrier Solution
Anode
302

FIG. 4A

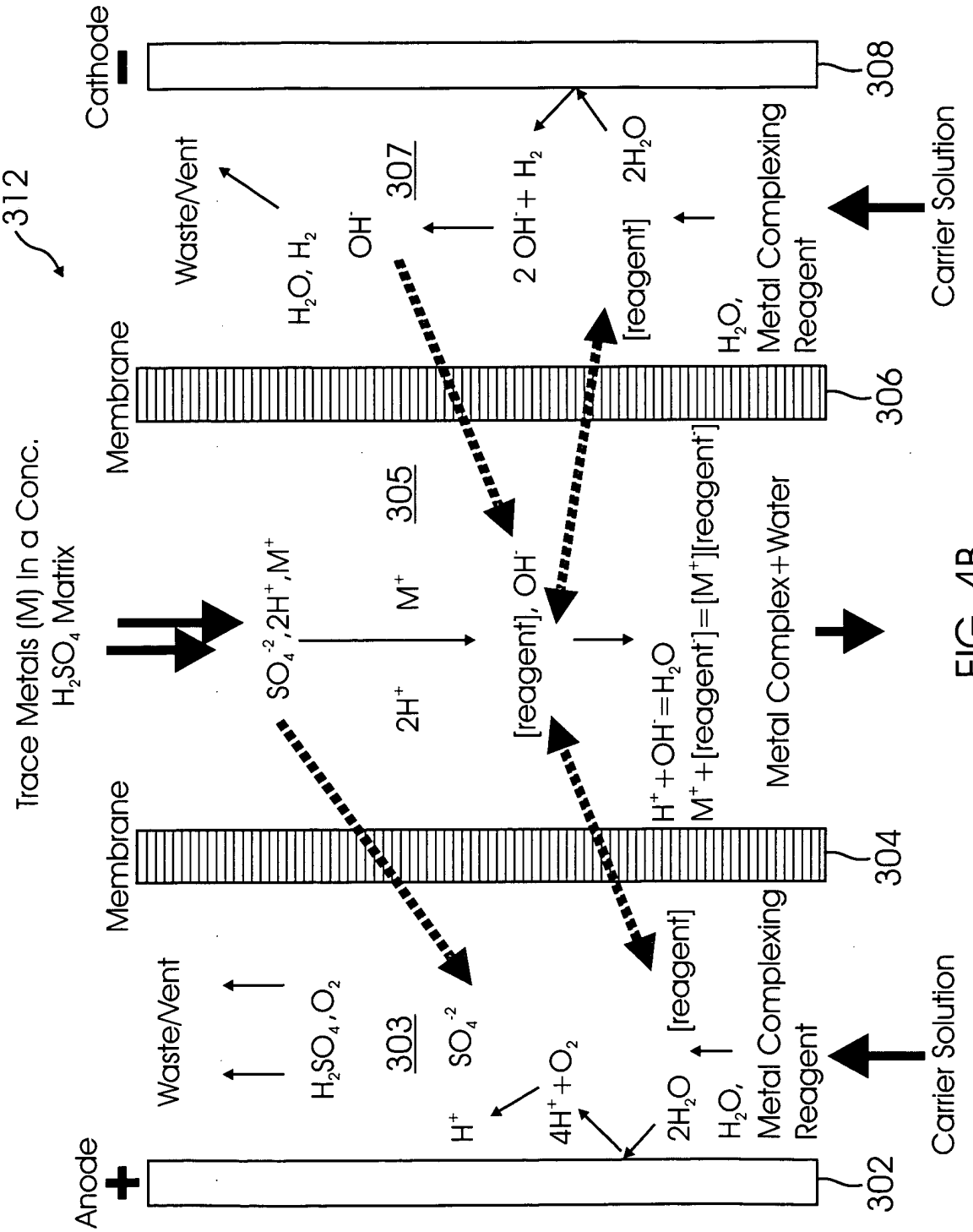
312
Cathode
308
Waste/Vent
H_2O, H_2
OH^-
307
$2OH^- + H_2$
$2H_2O$
[reagent]
H_2O, Metal Complexing Reagent
Carrier Solution
Membrane
306
Trace Metals (M) In a Conc. H_2SO_4 Matrix
SO_4^{-2}, $2H^+$, M^+
M^+
305
$2H^+$
[reagent], OH^-
$H^+ + OH^- = H_2O$
$M^+ + [reagent^-] = [M^+][reagent^-]$
Metal Complex+Water
Membrane
304
Waste/Vent
H_2SO_4, O_2
303
SO_4^{-2}
H^+
$4H^+ + O_2$
$2H_2O$
[reagent]
H_2O, Metal Complexing Reagent
Carrier Solution
Anode
302

FIG. 4B

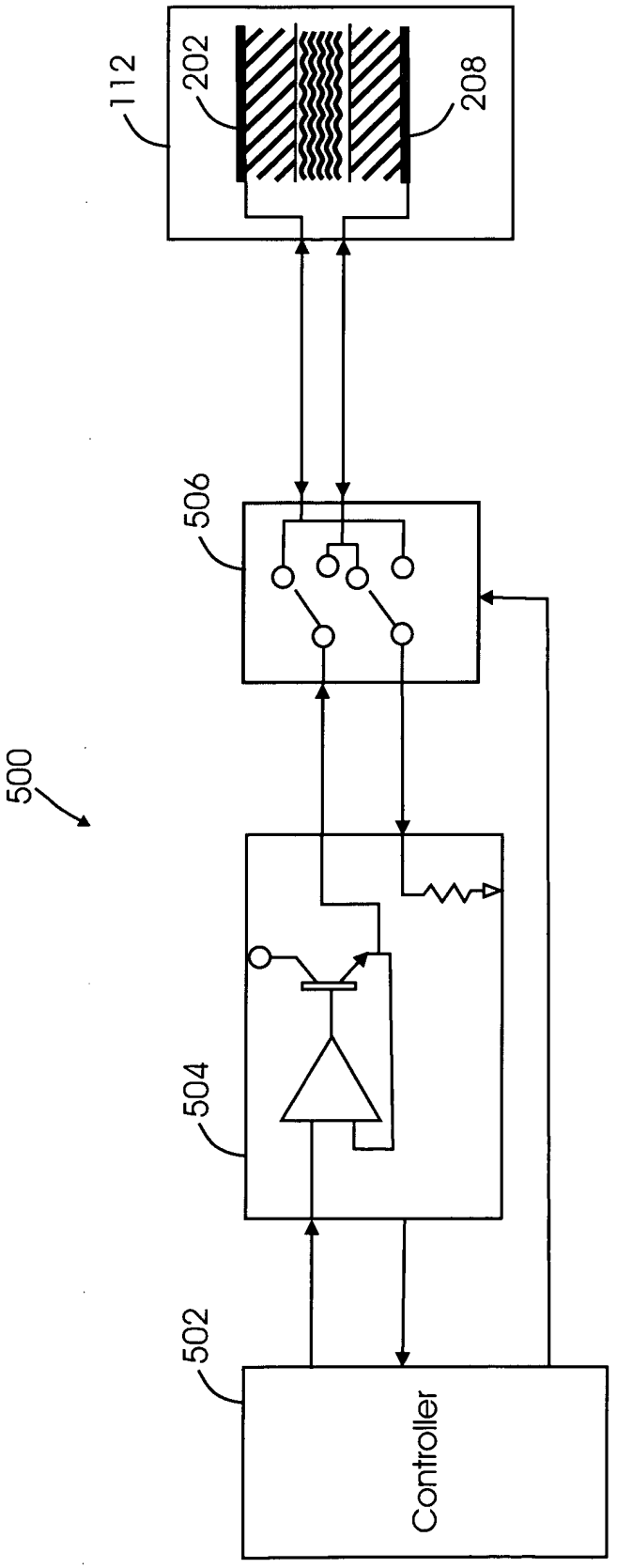

FIG. 5

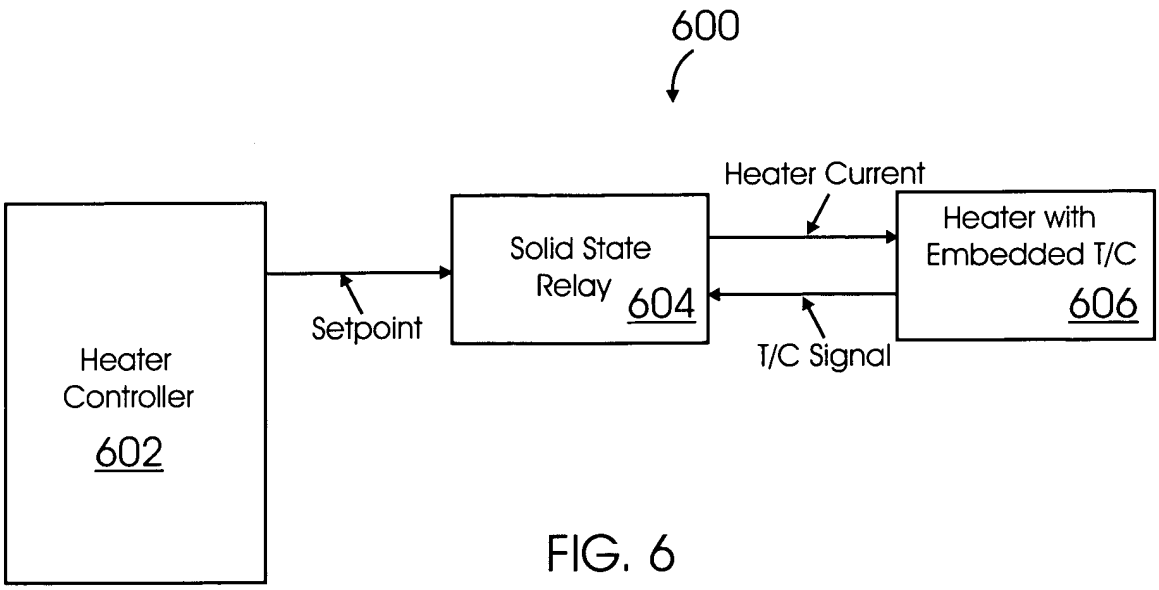
600
Heater Current
Heater with Embedded T/C
606
Solid State Relay
604
Setpoint
T/C Signal
Heater Controller
602

FIG. 6

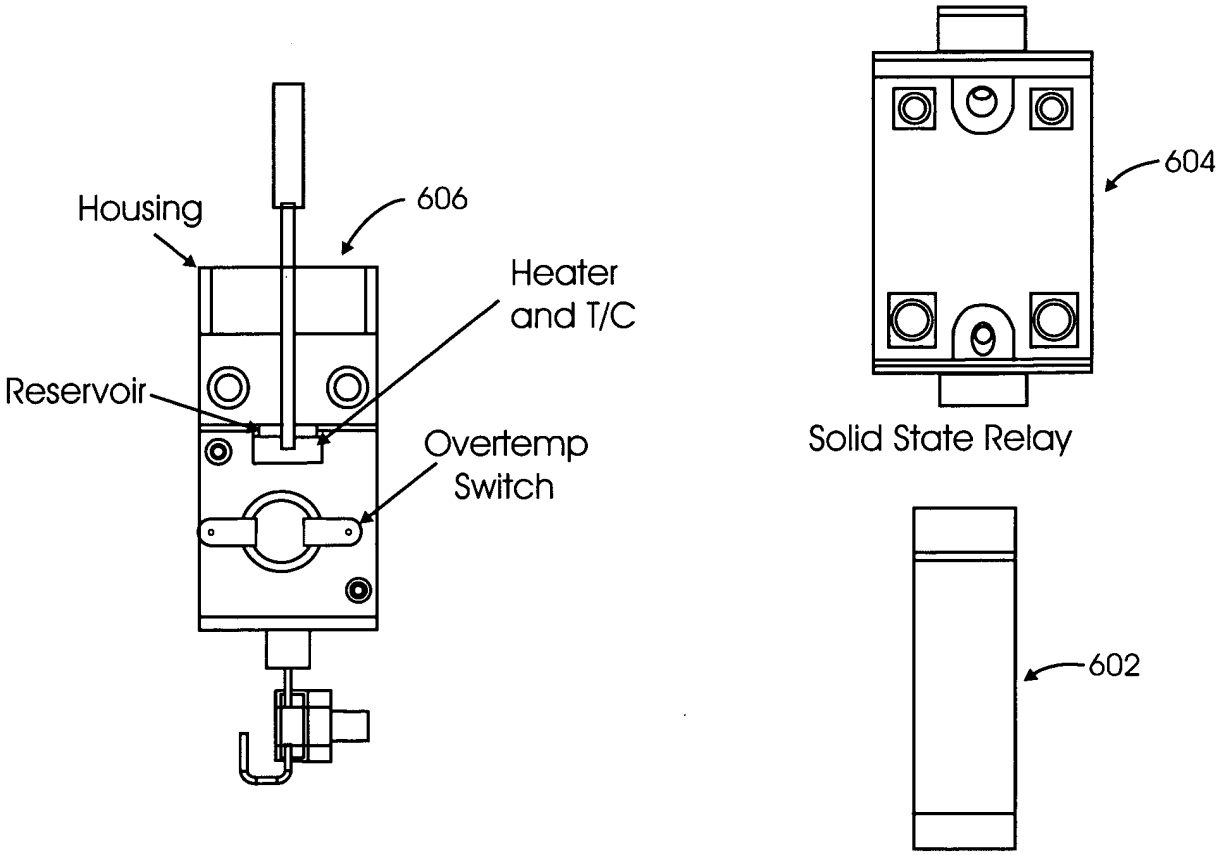
Housing
606
Heater and T/C
Reservoir
Overtemp Switch
604
Solid State Relay
602
Heater Controller

FIG. 7

```
' $Workfile: Memberane. config $
'
membrane_A_enable = 1
membrane_D_enable = 1

membrane.sensor.antibubble.retry=10        ' # of times to requery optical sensor when air is detected
membrane.sensor.antibubble.retry.delay= 1 ' delay (seconds)  between requeries of sensor when air is
detected

' Solution used with membrane
'

membrane_A_solutionname = HF
membrane_D_solutionname = H2SO4

' HF
'

HF_operating_vol = 1600                ' implied volume of solution in syringe before membrane operation
begins
HF_carrier_solution = HF                    ' ? no consequence
HF_carrier_syr_speed = 10                   ' ? no consequence
HF_refill_speed = 30                        ' speed to draw from reservoir back to the syringe

HF_stage1_neutralization_speed = 10  ' speed to push through membrane, in microliters/sec
HF_stage1_cycles = 2                        ' times to repeat this run
HF_stage1_current = 250                ' milliamps
HF_stage1_polarity = 0                      ' -1 = oscillate, 0 = negative,1 = positive

HF_stage2_cycles = 2
HF_stage2_polarity = 0
HF_stage2_neutralization_speed = 10
HF_stage2_current = 200

UPW_clean_num_cycles=2
UPW_clean_refill_speed=30                   ' speed UPW is drawn from resevoir to syringe
UPW_clean_neut_speed=10                     ' speed UPW is run through the membrane

HF_num_stages=2            ' increment this, and add additional HF_stageX parameters to have more stages
```

FIG. 8

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M-15242 US

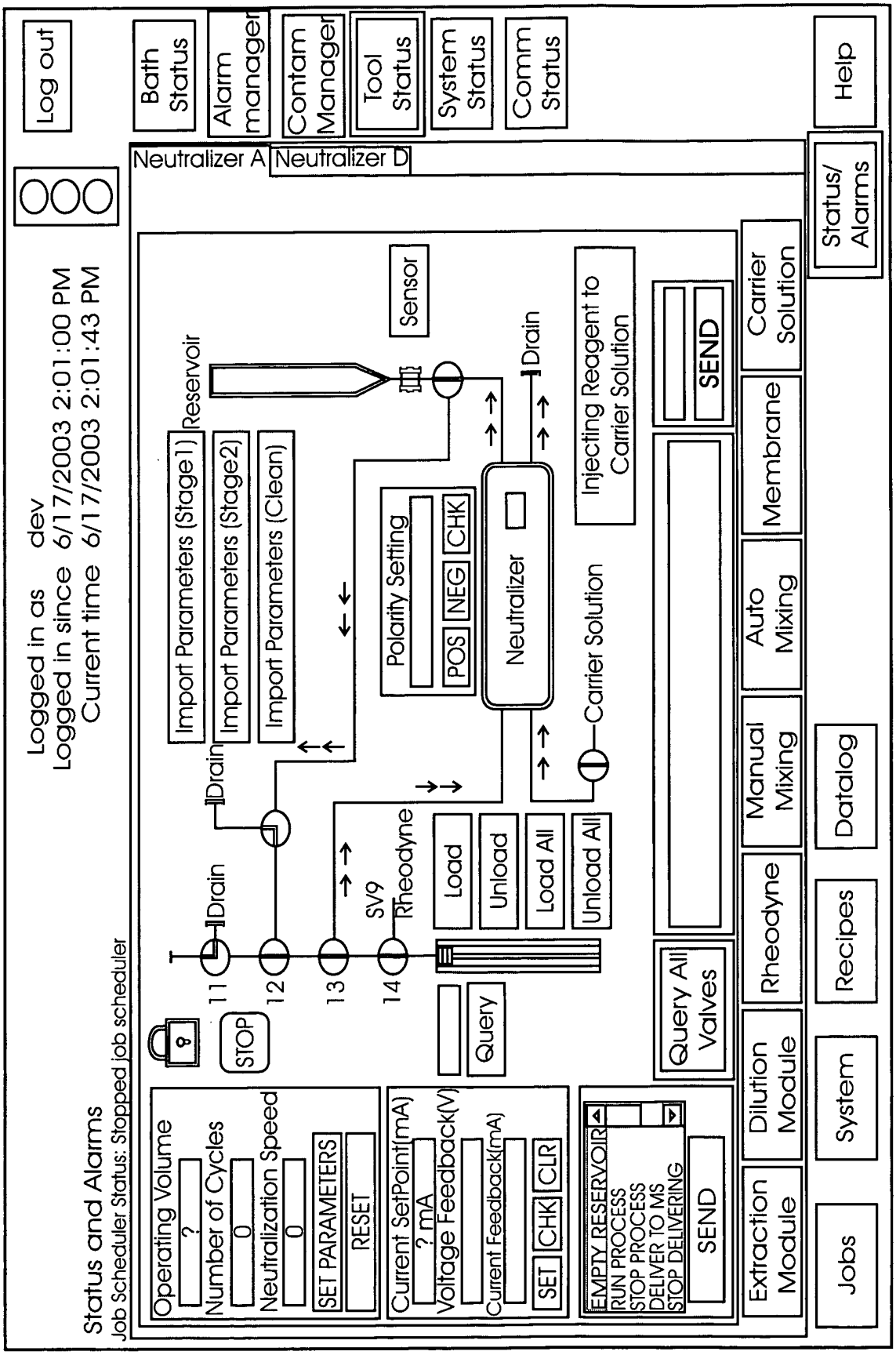
Log out
Bath Status
Alarm manager
Contam Manager
Tool Status
System Status
Comm Status
Help
Neutralizer A
Neutralizer D
Logged in as dev
Logged in since 6/17/2003 2:01:00 PM
Current time 6/17/2003 2:01:43 PM
Status and Alarms
Job Scheduler Status: Stopped job scheduler
Import Parameters (Stage1)
Import Parameters (Stage2)
Import Parameters (Clean)
Reservoir
Sensor
Drain
Polarity Setting
POS
NEG
CHK
Neutralizer
Injecting Reagent to Carrier Solution
Carrier Solution
SV9
Rheodyne
Load
Unload
Load All
Unload All
Query
STOP
11
12
13
14
Operating Volume
Number of Cycles
Neutralization Speed
SET PARAMETERS
RESET
Current SetPoint(mA)
Voltage Feedback(V)
Current Feedback(mA)
SET
CHK
CLR
EMPTY RESERVOIR
RUN PROCESS
STOP PROCESS
DELIVER TO MS
STOP DELIVERING
SEND
Query All Valves
SEND
Carrier Solution
Membrane
Auto Mixing
Manual Mixing
Rheodyne
Datalog
Recipes
System
Dilution Module
Extraction Module
Jobs
Status/ Alarms

FIG. 9

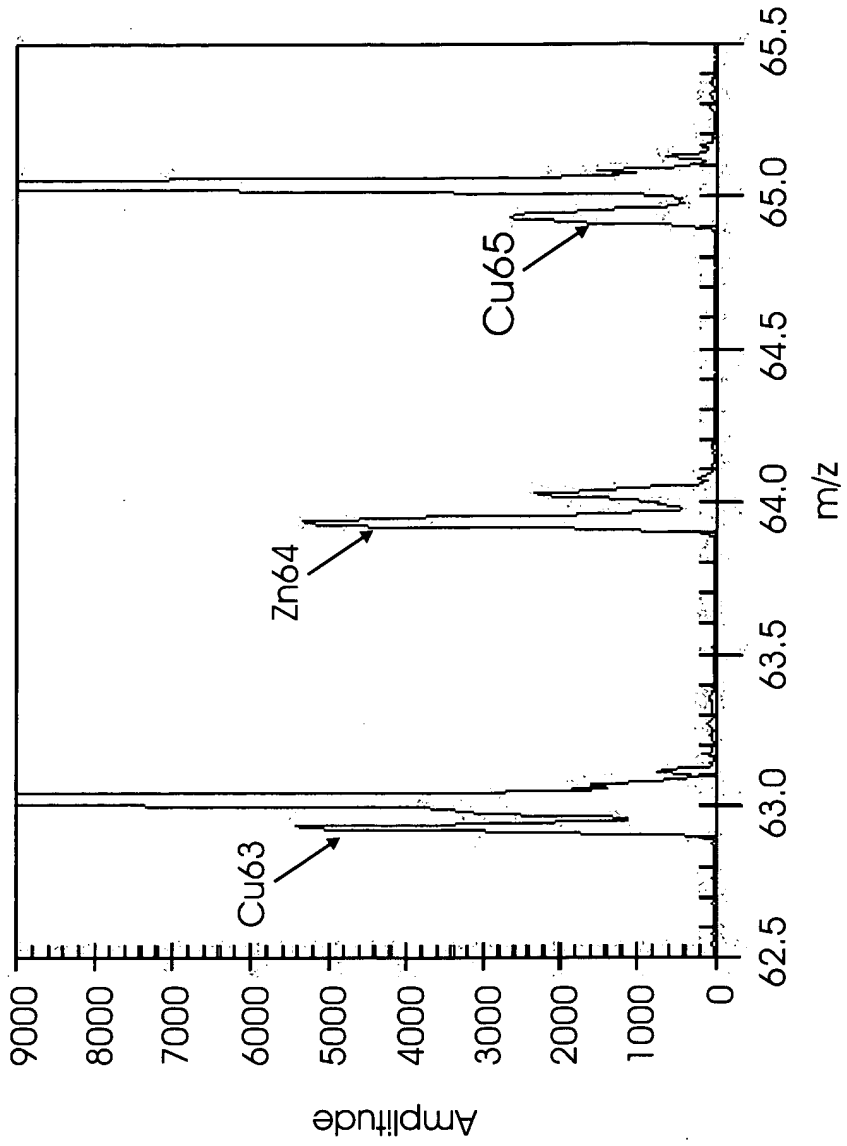
Amplitude
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
62.5
63.0
63.5
64.0
64.5
65.0
65.5
m/z
Cu63
Zn64
Cu65

FIG. 10

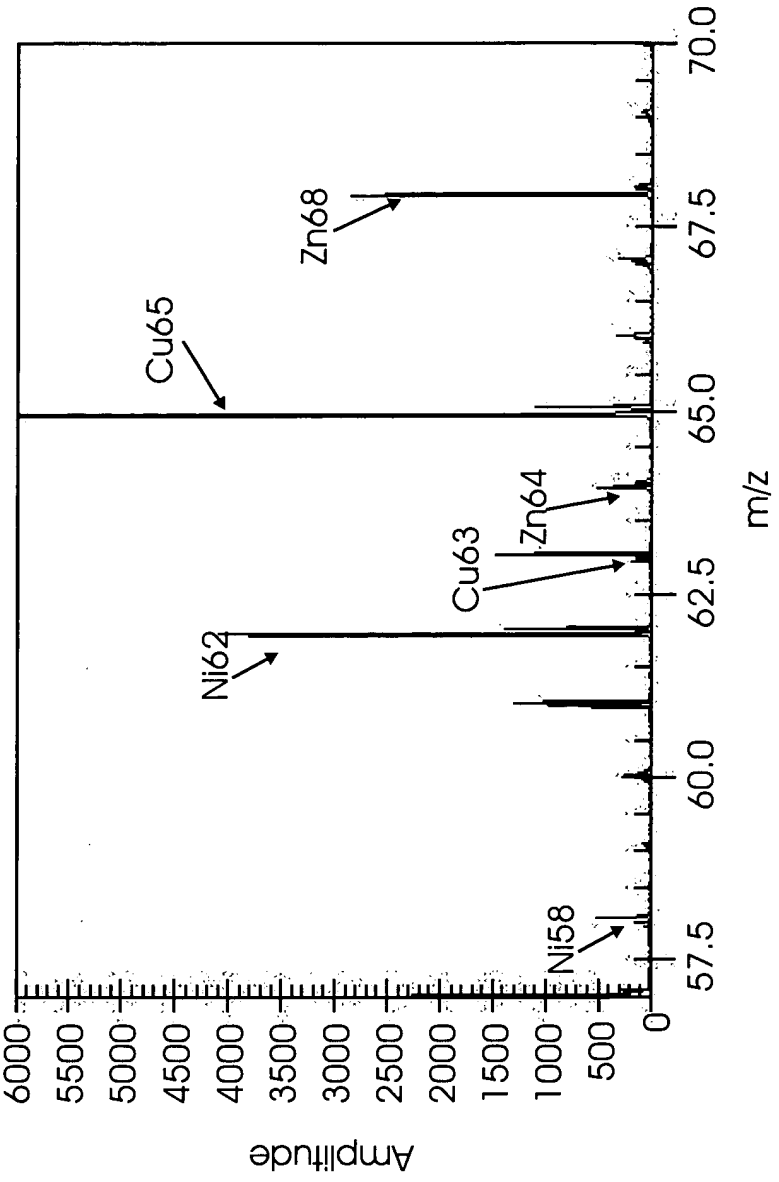
Amplitude
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
57.5
60.0
62.5
65.0
67.5
70.0
m/z
Ni58
Ni62
Cu63
Zn64
Cu65
Zn68

FIG. 11